

## 1919 CIRCUITRY (Flip-Flop Circuits)

Eccles and Jordan (USA)

In digital circuitry probably the most important single device is the bistable circuit or 'flip-flop'. Used today in innumerable modifications the original form of this circuit was developed in 1919 by Eccles and Jordan. During the late 1930s flip-flops in tandem connection began to be used by nuclear physicists to scale down the counting rate from Geiger-Muller counters by factors of  $2^n$ . These devices were all essentially binary counters in which the last 'carry' pulse was used as the output to a mechanical register. In 1944, Potter described a scale-of-ten counter in which feedback caused a binary counter to skip six of its possible 16 states. A neon lamp indicating the state of each flip-flop provided a binary-coded readout for each decade. In 1946, Grosdoff described another binary counter with feedback to provide a scale-of-ten circuit. Grosdoff's circuit featured a direct readout obtained by a matrix of resistors arranged to light one of ten neon lamps for each stable state of the counter. By connecting such decades in tandem direct reading decimal counting registers of arbitrarily large capacity were achieved and the way was cleared for the widespread application of high speed electronic counting.

SOURCE: 'Digital display of measurements in instrumentation' by B M Oliver *Proc. IRE* p 1170 (May 1962)

SEE ALSO: 'A highly accurate continuously variable frequency control system' by C H Vincent *Instruments and Methods* vol 7, p 325 (1960)